Memorandum

U.S. Department
of Transportation

**Federal Aviation
Administration**

Subject: INFORMATION: Policy Statement on Use of Surrogate Parts When Evaluating Seatbacks and Seatback Mounted Accessories for Compliance with §§ 25.562(c)(5) and 25.785(b) and (d)

Date: October 2, 2003

From: Acting Manager, Transport Airplane Directorate, Aircraft Certification Service, ANM-100

Reply to Attn. of: ANM-03-115-28

To: See Distribution

Regulatory Reference: 25.562(c)(5)
25.785(b) and (d)

Summary

The purpose of this memorandum is to streamline the seat certification process by providing Federal Aviation Administration (FAA) certification policy on using surrogate test articles in lieu of actual seatback mounted accessories (e.g., video monitor, telephone) during blunt trauma tests in accordance with §§ 25.562(c)(5) and 25.785(b) and (d). The seat back mounted accessories currently used for these tests are actual production parts or parts which are similar in construction to the production parts.

This policy will reduce certification delays caused by the unavailability of these accessories for certification tests. Additionally, these accessories are typically damaged during certification tests and are not usable in subsequent tests or for installation and delivery to a customer. This policy will reduce certification costs by allowing tests to be conducted without actual accessories.

Current Regulatory and Advisory Material

Section 25.562(c)(5) requires that each occupant must be protected from serious head injury under the conditions prescribed in paragraph (b) of that section. Where head contact with seats or other structure can occur, protection must be provided so that the head impact does not exceed a Head Injury Criterion (HIC) of 1,000 units.

Section 25.785(b) requires that each seat, berth, safety belt, harness, and adjacent part of the airplane at each station designated as occupiable during takeoff and landing must be designed so that a person making proper use of those facilities will not suffer serious injury in an emergency landing as a result of inertia forces specified in §§ 25.561 and 25.562.

Section 25.785(d) requires, in pertinent part, that each occupant of a forward or aft facing seat be protected from head injury by the elimination of injurious objects within the striking radius of the head.

Policy

In many row-to-row seat configurations, seatback mounted accessories are installed within the head paths of forward facing seated occupants. In order to demonstrate compliance with the aforementioned requirements, tests are conducted to assess the injury potential of these seatbacks and accessories. This policy memorandum only addresses head injury caused by blunt trauma. It does not address parts that become loose or sharp projections that are formed that may be injurious to a seated occupant during a head impact.

The types of tests that are conducted for blunt trauma assessments are dependant on the certification basis of the airplane. Airplane certification bases, which include § 25.562(c)(5), require that protection be provided so that a head impact does not result in a HIC greater than 1,000 units under the dynamic test conditions specified in § 25.562(b). Typically, airplanes which do not have § 25.562(c)(5) in their certification basis, must still comply with the more general occupant protection requirements of §§ 25.785(b) and (d). Sections 25.785(b) and (d) require that a seat be designed so that an occupant would not suffer "serious injury" in an emergency landing and that injurious objects within the striking radius of the head be eliminated. As a result, seatbacks/accessories on these airplanes must be evaluated to ensure that an occupant would not suffer serious head injury from blunt trauma.

Currently, blunt trauma tests are conducted with seatback mounted accessories represented by actual production parts or parts that are similar in construction to the production parts. Industry has informed the FAA that certification delays occur due to the unavailability of actual accessories for testing. In addition, accessories are typically damaged during certification tests and are not usable in subsequent tests or for installation and delivery to a customer. Several specimens of the same part are repeatedly used, and damaged, during certification tests due to test failures or substantiating alternate seatback designs. This results in significant costs to manufacturers and customers.

The FAA has determined that it is acceptable to use a surrogate test article made of 6061-T4 aluminum which meets the below criteria in lieu of an accessory for demonstrating compliance with §§ 25.562(c)(5) and 25.785(b) and (d) for blunt trauma assessments. An exception to the use of the surrogate test article occurs when the accessory is more rigid (deflects less and absorbs less energy during impact) than the plate defined in this memorandum. In that case, the accessory should be used in the test(s) and not a surrogate test article.

The following criteria are applicable when using a surrogate test article during blunt trauma testing in accordance with §§ 25.562(c)(5) and 25.785(b) and (d):

- The surrogate part should be fabricated from 6061-T4 aluminum and have a minimum thickness of 0.238 inch (i.e., 0.25 inch minus a 0.012 inch manufacturing tolerance) at all locations. The length and width of the surrogate part should equal, within tolerances, the length and width of the actual part, respectively.

- The exposed surface of the surrogate part that will be impacted should be flat. That is, it is not required to have the contour of the accessory's exposed surface represented by the surrogate part. Note that this is based on typical accessory installations which are essentially mounted flush with the seatback and have a generally homogeneous contact area. Small variations in the surface due to the contour of plastic parts may be ignored. Designs that differ from this (e.g., a design with an exposed structural protrusion) might require the exposed surface of the actual part to be represented in order to adequately assess head injury potential.

- The weight of the surrogate part, and additional ballast if needed, should be ±10 percent of the weight of the actual part.

- The surrogate part should be located on the seatback in the same place (i.e., within manufacturing tolerances for mounting the actual part) where the actual part would be located in terms of the x and y coordinates in the attached figure. The surrogate part should be located such that the surface, which will be contacted during the test, is at the same location (i.e., within manufacturing tolerances for mounting the actual part) where the actual part would be in terms of the z coordinate (see the attached figure).

- The surrogate part should be attached to the seat by the final production hardware or a conservative representation of the final production hardware. For substantiating blunt trauma requirements, a conservative representation of the attachment hardware would be at least as rigid as the actual hardware. The surrogate part should be mounted so that it would not move farther or faster, with respect to the seatback, than the actual part during the test. Note that a conservative representation of the attachment hardware for determining HIC may not adequately represent the attachment hardware for substantiating it to § 25.562 loads. However, if the attachment hardware is adequately represented for substantiating it to § 25.562 loads, the test using a surrogate part may also be used to demonstrate that the attachment hardware will retain the actual accessory under § 25.562 loads.

- If the surrogate part cracks during a test, the test results are invalid.

A surrogate part made of a material and thickness other than 6061-T4 aluminum in a thickness of 0.25 inch may be used if an FAA Aircraft Certification Office finds that it is at least as rigid (i.e., it deflects less and absorbs less energy during the test). Surrogate test articles which are less rigid than the aluminum surrogate part defined above are not addressed in this memorandum. If an applicant desires to use a surrogate part which is less rigid, its use should be approved through the issue paper process (or equivalent) or by an FAA policy memorandum. Testing may be required to determine the acceptability of these less rigid surrogate parts.

Effect of Policy

The general policy stated in this document does not constitute a new regulation or create what the courts refer to as a "binding norm". The office that implements policy should follow this policy when applicable to the specific project. Whenever an applicant's proposed method of compliance is outside this established policy, it must be coordinated with the policy issuing office, e.g., through the issue paper process or equivalent. Similarly, if the implementing office becomes aware of reasons that an applicant's proposal that meets this policy should not be approved, the office must coordinate its response with the policy issuing office.

Applicants should expect that the certificating officials will consider this information when making findings of compliance relevant to new certificate actions. Also, as with all advisory material, this policy statement identifies one means, but not the only means, of compliance.

/s/

K. C. Yanamura

Attachment: Surrogate Part Installed on Seatback